

NCE 3-2689

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25X1

TEST REPORT

RR-2B RECEIVER

N.E.M.S. PROTOTYPE #4

25X1

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I INTRODUCTION

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[redacted]
resubmitted their prototype model of the RR-2B Radio Receiver to the Research and Development Branch of Commo Engineering on July 17, 1953. Our report dated April 22, 1952, constituted a rejection of the set as originally submitted. This report covers the acceptance tests conducted on the latest model received.

II SUMMARY

Sufficient tests were conducted to insure that the manufacturer has complied with the requests outlined in the first report. On all but a few minor points prototype #4 meets specifications. This model of the RR-2B receiver is considered to be an acceptable prototype.

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1. MECHANICAL SECTION1.1. MECHANICAL INSPECTION

Satisfactory measures were taken by the manufacturer to correct the mechanical defects noted during the inspection of the original RR-2B prototype. A submersion test was not considered necessary on this model due to the excellent results obtained in previous tests.

2. ELECTRICAL SECTION2.1. ELECTRICAL TESTS2.1.1. ANTENNA INPUT IMPEDANCE

Band	Frequency (mc/s)	Impedance (Ohms)
1	3.0	200
	4.5	200
	6.0	484
2	6.0	314
	9.0	282
	12.0	848
3	12.0	102
	18.0	95
	24.0	315

The test was conducted in accordance with the following specification: No. 50-1003-, Para. C-13.

2.1.2. SELECTIVITY

DB Down	Bandwidth (kc/s)
6	2.890
20	7.620
40	14.870
60	23.180

Test Frequency - 4.5 mc/s

The test was conducted in accordance with the following specification: No. 50-A-1003-A, Para. F-2.

2.1.3. SENSITIVITY

Band	Frequency (mc/s)	Raw Noise (mw)		10 DB S/N (uv)	
		AM	CW	AM	CW
1	3.0	0.18	0.49	1.35	*
	3.5	0.36	0.91	1.50	
	4.1	0.49	1.11	1.50	
	4.8	0.36	0.81	1.40	
	5.5	0.56	1.21	1.35	
	6.0	0.72	1.44	1.30	
2	6.0	0.04	0.16	1.25	
	7.0	0.06	0.20	1.25	
	8.2	0.08	0.25	1.30	
	9.6	0.04	0.18	1.20	
	11.0	0.06	0.20	1.05	
	12.0	0.14	0.42	0.90	
3	12.0	0.01	0.03	1.20	
	14.0	0.02	0.11	1.35	
	16.4	0.05	0.20	1.30	
	19.2	0.01	0.06	1.45	
	22.0	0.02	0.09	1.65	
	24.0	0.06	0.25	1.25	

* The CW sensitivity was better than the AM sensitivity.

The tests were conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. F-1.

11 October 1950, Para. 3.2.4. & 4.2.6.
No. 52-A-1022-A, Para. 2.2.

2.1.4. STABILITY2.1.4.1. FREQUENCY STABILITY DURING WARM-UP

The results obtained by the contractor under Navy inspection were acceptable.

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. F-4.
No. 52-A-1022-A, Para. 1.3.

2.1.4.2. FREQUENCY STABILITY VS. B₁ SUPPLY VOLTAGE VARIATION

B ₁ Supply (volts)	Deviation (c/s)		
	Band 1 (4.5 mc)	Band 2 (9 mc)	Band 3 (13 mc)
110	0	0	0
105	50	100	2560
100	100	280	6800
95	250	630	*
90	*	*	*

* approximate point where H.F.O. quit

The RP-1 power supply was set for 110 volts and the input was varied with a variac.

2.1.4.3. HAND CAPACITY EFFECTS

The RR-2B receiver was practically immune to the effects of hand capacity upon its frequency.

2.1.4.4. MECHANICAL STABILITY

Jarring and other rough handling did not cause excessive frequency shift.

2.1.5. IMAGE REJECTION RATIO

Band	Test Frequency (mc/s)	Rejection Ratio
1	6.0	1/100 - 40 db
2	12.0	1/50 - 34 db
3	24.0	1/100 - 40 db

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. F-3.
11 October 1950, Para. 4.2.4.
No. 52-A-1022-A, Para. 1.2.

2.1.6. I.F. REJECTION RATIO

Band	Test Frequency (mc/s)	I.F. Frequency (mc/s)	Rejection Ratio (db)
1	6.0	0.455	100 \neq
2	12.0	0.455	100 \neq
3	24.0	0.455	100 \neq

2.1.7. SPURIOUS RESPONSE REJECTION RATIO2.1.7.1. EXTERNAL SPURIOUS RESPONSE

Band	Receiver Frequency (mc/s)	Spurious Frequency (mc/s)	Response (db)
1	3.0	none	---
	4.5	4.75	69.5
	6.0	6.25	69.6
	6.0	12.50	79.0
	6.0	13.40	78.5
2	6.0	6.25	73.7
	9.0	9.25	63.7
	12.0	12.25	74.0
	12.0	12.75	74.5
3	12.0	12.25	70.0
	18.0	18.25	62.9
	24.0	24.25	52.7
	24.0	24.75	77.7

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. F-6.
No. 52-A-1022-A, Para. 1.4.

2.1.7.2. INTERNAL SPURIOUS RESPONSE

No internal spurious responses were detected in the RR-2B receiver.

2.1.8. OVERALL AUDIO FREQUENCY RESPONSE

Frequency (c/s)	Response (db)
40	-12.00
70	- 7.50
100	- 5.00
200	- 2.00
400	0
700	- 0.50
1000	- 2.00
2000	- 9.00
4000	-17.00

Test Frequency - 10.7 mc/s

2.1.9. CROSS SIGNAL DISTORTION PRODUCTS

Band	Frequency (mc/s)	Response (db)
1	5.45 (Difference Frequency) 5.95 (Sum Frequency)	76.4 73.6
2	11.45 (Difference Frequency) 11.95 (Sum Frequency)	83.1 80.4
3	23.45 (Difference Frequency) 23.95 (Sum Frequency)	100 / 100 /

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. F-7.
No. 52-A-1022-A, Para. 1.5.

2.1.10. CRYSTAL H.F.O. OPERATION

Band	Receiver Frequency (mc/s)	Crystal Frequency (mc/s)	Sensitivity AM - (uv)
1	4.345	4.800	1.35
2	9.145	4.800	0.90
3	18.145	6.200	2.20

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. F-5.
11 October 1950, Para. 4.2.3.

2.1.11. R.F.O. OPERATION

The RR-2B R.F.O. meets the requirements of the following specifications and modifications: No. 50-A-1003-A, Para. C-15.
 11 October 1950, Para. 4.2.5.
 No. 52-A-1022-A, Para. 2.1.

2.1.12. DIAL CALIBRATION ACCURACY

Band	Receiver Dial Setting (mc/s)	Error (c/s)	Error Parts in 1800
1	3.0	1840	1.10
	3.9	2230	1.03
	5.1	6480	2.29
	6.0	-1740	0.52
2	6.0	5900	1.77
	7.8	4750	1.10
	10.2	18350	3.24
	12.0	23280	3.49
3	12.0	5850	0.88
	15.6	10760	1.24
	20.4	47860	4.22
	24.0	16700	1.25

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. C-10.
 11 October 1950, Para. 4.2.1.

2.1.13. RESETTABILITY

Band	Frequency (mc/s)	Error (c/s)	Error Parts in 1800
1	4.5	590	0.212
2	9.0	850	0.170
3	18.0	2100	0.210

This test was conducted in accordance with the following specifications and modifications: No. 50-A-1003-A, Para. C-11.
 11 October 1950, Para. 4.2.1.

3. CONCLUSION

The resubmitted RR-2B prototype failed to meet specifications in only two tests. In the first, External Spurious Responses, a number of relatively weak spurious signals were found. With two exceptions they followed a definite pattern, being located 250 kc/s and 750 kc/s above the receiver frequency in each case. Also the Cross Signal Distortion Product's test disclosed that the rejection of bands 1. and 2 was below the specified 90 db.

Neither of these defects was considered to be of sufficient importance to warrant rejection of this prototype (#4), although the contractor should continue his efforts to improve them.

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